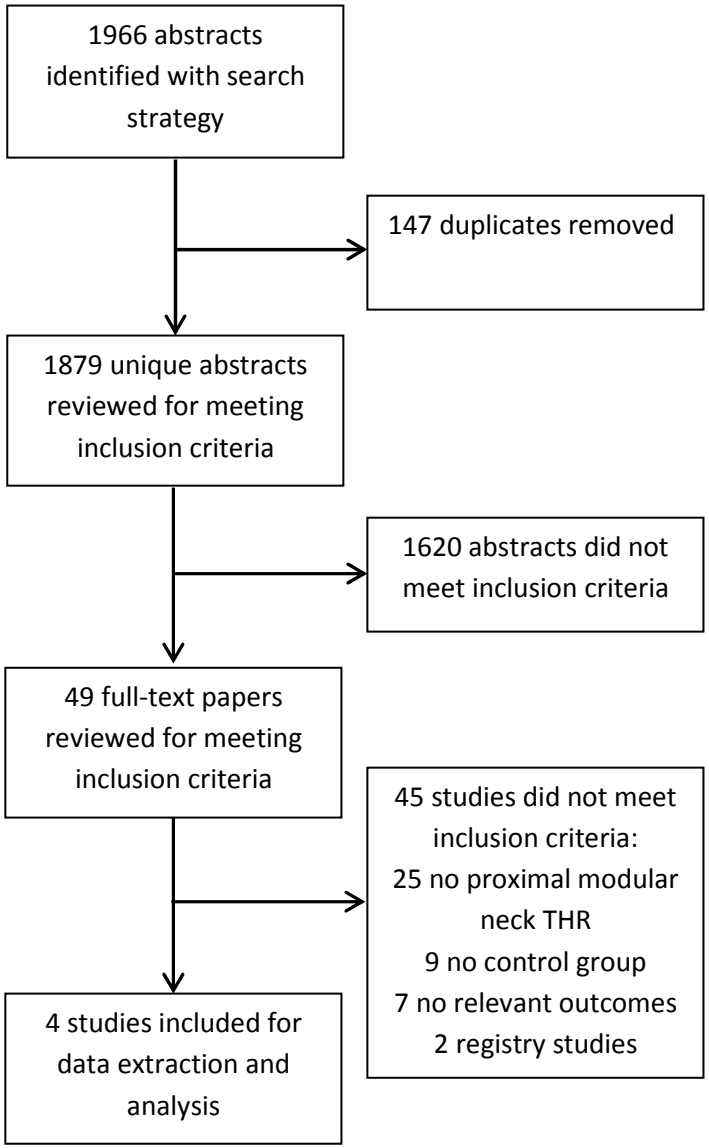
Appendix 3: Total hip replacements with a proximal modular femoral neck

- Flow diagram of included studies
- Study details 1 (aspects of internal validity)
- Study details 2 (aspects of external validity)
- Study reported outcomes
- References


1966 abstracts identified with search strategy
147 duplicates removed
1879 unique abstracts reviewed for meeting inclusion criteria
1620 abstracts did not meet inclusion criteria
49 full-text papers reviewed for meeting inclusion criteria
45 studies did not meet inclusion criteria:
25 no proximal modular neck THR
9 no control group
7 no relevant outcomes
2 registry studies
4 studies included for data extraction and analysis

		Study details I (aspects of internal validity)									
Study	**Study design**	**Allocation method and concealment**	**Blinding (surgeons/ patients/ assessors)**	**Prospective collection and evaluation purpose**	**Sample size needs clearly defined?**	**Primary Outcome specified? (yes/no)**	**Intention-to-treat analysis? (yes/no)**	**Consecutive patients series? (yes/no)**	**Group comparability assessed?**	**Controlling for con-founding?**	**Procedure period**
Duwelius, 2013	Retrospective comparison of successive non-consecutive cohorts	Time period	No	Prospective inclusion and collection, retrospective purpose	No	No	No	Unclear	Yes	Multi-variable analysis for baseline differences	August 2005 – December 2009
Gerhardt, 2014	Retrospective matched group comparison	Stock/availa-bility at operating room	No	No	No	Radio-graphic measure-ments	Unclear	No	No	Matching (demo-graphics and surgery date)	March 2008 – July 2011
Gualdi, 2006	Retrospective comparison of successive consecutive cohorts	Time period	No	No	No	No	No	Yes	No	No	1999 – 2006
Sakai, 2010	Retrospective matched group comparison	Surgeon's preference	Assessors	No	No	Unclear	No	Unclear	Demographics and preoperative assessments	Matching (demo-graphics and disease severity)	January 1994 – July 1996

Study details II (aspects of external validity)											
Study	**No. Of replace-ments (no. of patients)**	**Mean age (SD, range)**	**Female (%)**	**Osteo-arthritis (%)**	**Mean length of FU (yrs; SD, range)**	**Follow-up com-pletion (%)**	**Prosthesis brands (new vs conventional)**	**Manufactur er**	**Site, surgeon**	**Hospital setting (designer/ university/ general)**	**Continent (country)**
Duwelius, 2013	878 (878)	62 (10)	52.4	93.2	NA (2.0-NA)	53.7-58.0	M/L taper Kinective *versus* M/L taper	Zimmer	Single site single surgeon,	General	North America (US)
Gerhardt, 2014	170 (170)	65.0 (33-88)	56.5	100	NA (NA)	NA	Alloclassic Zweymuller *versus* Profemur Z	Zimmer and Wright Medical	Single site, multiple surgeons	General	Europe (Nether-lands)
Gualdi, 2006	519 (NA)	NA	NA	NA	1 (NA)	NA	Profemur Z *versus* Centerplus	Wright Medical and Ceraver	Single site, multiple surgeons	General	Europe (Italy)
Sakai, 2010	163 (133)	53.8 (40-73)	91.9	100% second-ary to develop-mental dysplasia	14.5 (13-15)	92.9	Custom designed un-cemented modular neck system (Anca system) *versus* uncemented ana-tomical metal cancellous femoral component	Cremascoli (Milan, Italy) and ESKA (Lubeck, Germany)	Single site, multiple surgeons	University	Asia (Japan)

Study	Quality	Outcome	Harris Hip Score (mean, SD / range)		Flexion (mean, SD / range)		Abduction (mean, SD / range)		Dislocation (count, proportion)		Revision (count, proportion)	
			Modular	Standard	Modular	Standard	Modular	Standard	Modular	Standard	Modular	Standard
Duwelius, 2013	Moderate	Preoperative	52 (13)	50 (13)	NA	NA	NA	NA	-	-	-	-
		Postoperative	92 (10)	90 (15)	NA	NA	NA	NA	5 (0.8%)	5 (1.8%)	7 (1.4%)	3 (1.0%)
Gerhardt, 2014	Low to moderate	Preoperative	NA	NA	NA	NA	NA	NA	-	-	-	-
		Postoperative	NA	NA	NA	NA	NA	NA	4 (4.2%)	4 (4.2%)	2 (2.1%)	2 (2.1%)
Gualdi, 2006	Low	Preoperative	NA	NA	NA	NA	NA	NA	-	-	-	-
		Postoperative	NA	NA	NA	NA	NA	NA	8 (2.2%)	6 (3.9%)	NA	NA
Sakai, 2010	Low to moderate	Preoperative	44.6 (18.4-0.5)	46.6 (16.1-5.7)	71 (10-110)	72 (15-120)	13 (0-30)	14.9 (0-35)	-	-	-	-
		Postoperative	98.6* (64-100)	93.9 (68-100)	96 (45-120)	91 (5-120)	32* (15-40)	28 (0-40)	0 (0%)	0 (0%)	0 (0%)	1 (1.4%)

NA = not available (not applicable or not provided), * significant difference

Duwelius PJ, Burkhart B, Carnahan C, Branam G, Ko LM, Wu Y, et al. Modular versus nonmodular neck femoral implants in primary total hip arthroplasty: which is better? Clin Orthop Relat Res 2014 Apr;472(4):1240-5.

Gerhardt DM, Bisseling P, de VE, van Susante JL. Modular Necks in Primary Hip Arthroplasty Without Anatomical Deformity: No Clear Benefit on Restoration of Hip Geometry and Dislocation Rate. An Exploratory Study. J Arthroplasty 2014 Feb 10.

Gualdi A, Masnaghetti P, Borroni G, et al. Fixation and geometry in total hip prosthesis: Is compromise necessary or is optimisation possible?. [Italian]. Minerva Ortopedica e Traumatologica 57 (4):289-292, 2006.

Sakai T, Ohzono K, Nishii T, Miki H, Takao M, Sugano N. A modular femoral neck and head system works well in cementless total hip replacement for patients with developmental dysplasia of the hip. J Bone Joint Surg Br. 2010 Jun;92(6):770-6.